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IMAGERY ILLUSIONS. THE NON-VISUAL CHARACTER
OF THE PROOFREADER'S ILLUSION¹

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The object of this paper is twofold. First, the question will be raised whether certain illusions, of which the oft-cited proofreader's illusion may be taken as a convenient instance, are really errors of perception. It will be maintained that they are not, but that they are due to an erroneous *imagery* that gets aroused. In the second place, on the analysis leading to the above conclusion a classification of illusions will be presented based on the degree of examinability which any suspected perceptual experience allows.

I

One who had never experienced the proofreader's illusion but was familiar with the numberless descriptions of it that are given in the books, would be likely to regard as a sheer paradox the statement that this need not be a visual illusion at all. Yet such is the thesis which this paper undertakes to uphold. A curious error appears to have been perpetuated in connection with this proofreader's illusion. Very simply and directly stated the error consists in maintaining that when we overlook a misprinted word and read it as if it were correct, the correctly printed word is actually *seen* by the reader,—the illusion consisting, of course, in the non-correspondence between what is actually seen and what is really there. Let me quote from three relatively recent writers. Professor Angell, on page 132 (ed. 4, p. 162) of his *Psychology*, says: "Thus, if we come across the word mispirnt, many of us will read

¹This paper, hitherto unpublished, was read by the late Professor Pierce at the meeting of the American Psychological Association in 1906.

it in all good faith as misprint and never see the difference. We react to the general visual impression and its suggestion, and see what really is not before us." And Professor Thorndike, on page 230 of his *Elements of Psychology*, says: "Thus in reading, some of the words which we feel ourselves to see are not seen at all and others are seen as quite different from their actual printed forms." And Professor Witmer, in language hardly less unambiguous, writes on page 23 of his *Analytical Psychology*: "The failure to observe an error demonstrates that the tendency to apperceive words as they would appear when correctly printed is strong enough to modify the perception received from the word as it is really printed."

Now, speaking for myself, this view receives no introspective support. I find no evidence that I *see* a correctly printed word. The fact is, indeed, that I *read* the word correctly, but this is by no means necessarily a visual act. It is more likely to be an affair of articulation—actual or imaged—or at least of some variety of non-visual imagery, very possibly auditory in character. In the rapid movements of reading, only enough of the misprinted word is seen to evoke the usual and expected escort. In reading aloud this would be the movement of articulation. The right word would be pronounced because a sufficient number of the word's salient features would have been seen to make this easily possible. When not reading aloud, however, there are several situations conceivable. (1) The portions of the word that are actually seen may receive a central supplementing that is entirely *visual* in character. In this case the illusion would indeed be visual. And it is this single possibility that seems to have occupied the attention of writers too exclusively. Or, (2) the portions of the word that are actually seen may associatively arouse some form of *non-visual* imagery representative of the correct word. This imagery may be *articulatory*, the word being mentally pronounced as it should be; or *auditory*, the correct word being mentally heard; or it may be that the grapho-motor, or any other conceivably adequate non-visual imagery, is what gets aroused by the actually seen fragments of the printed word. In none of these cases can the illusion be called visual. Our temptation to so name it comes, I suppose, from the expectation that if we again look at the word, we shall see the exact equivalent of what we have just been mentally pronouncing or mentally hearing.

I have no experiments to cite in support of the second alterna-

tive, nor am I acquainted with any experimental data which can be called upon to decide the issue. Indeed, for reasons that will appear, I believe this question to be less readily settled by deliberate experimental examination than by an occasional surprising of oneself in the act. To this end I have for several years been noting my own experiences in this connection, and it is these which I would like now to report.¹

(a) Riding in an electric car through the business section of a city, and letting the gaze wander unconstrainedly about, I find myself mentally saying "Nonpareil." A visual image of the word immediately follows and I think of some commodity or machinery which is being advertised. Glancing back, however, I see the name "John Parnell" over the door of the store just passed. Now, to be sure, I had a visual *image* of "Nonpareil," but I certainly had no visual *perception* of it. And, what is more important, the visual image was secondary to the articulatory image.

(b) On the cover of one of the numbers of the *PSYCHOLOGICAL BULLETIN* stands a title: "A Note on Color Discrimination in the Creek Chub." The last two words I found myself mentally pronouncing "Greek Club," visual imagery immediately following appropriate to the Greek Club of a certain college. Looking back at the title, I saw my error. Here again I am sure that the illusion was not visual. As to whether visual imagery of the two words themselves followed the articulatory imagery in this case, I can make no positive statement. But the point here most particularly and emphatically to be insisted upon is that the illusion-giving imagery is of a modality different from that of the perceptual material arousing it.²

These two cases are entirely typical, and they may for the moment suffice as illustrations. I may add that I have again and again been able to analyze these experiences, and they have been numerous enough and definite enough to convince me that the

¹ Hitherto I have spoken of the proofreader's illusion as if it consisted in correctly reading a wrongly printed word. But the incorrect reading of correctly printed words is, of course, no less in point. An extreme case of the illusion is the reading into the text of a "not," or of any similarly significant particle. Cf. Thorndike, *Elements of Psychology*, p. 230.

² A visual image of the word following upon the articulatory, or auditory, image wrongly aroused by the imperfectly seen print is by no means a universal occurrence. In rapid reading this sequent visual image is unlikely to arise. One gets rather those visual images of objects or situations that are appropriate to the larger promptings of the context. Usually, therefore, the visual character of this illusion is even less prominent than in the first case cited.

usual treatment of the proofreader's illusion is inadequate for my particular case.

Now, in its general features, the experience that the above cited cases illustrate is common enough to every one. What we read differs all too frequently from what stands printed on the page before us. And all that the numerous investigations of the reading process—from that of Erdmann and Dodge to that of Dearborn—have taught us in reference to the perceptive and apperceptive processes involved in this complex of functions serves only to show how thoroughly and how constantly any rapid reader is exposed to illusion. We see in general only the salient or the dominating elements of the word before us, and on the basis of these fragments we apperceive, or believe that we have recognized, the entire word. But our readiness to assimilate these dominating fragments to a wrong set of associates is often just as great as to supplement them correctly. In my own cases, the verbal fragments seen were illusion-bringing because they aroused articulatory factors which the perception of the entire word would not have aroused.

It is of course, in part, the existence of more or less fixed verbal habits which furnishes the prevailing conditions for these illusions. One is driven by the momentum of the foregoing text to utter one word rather than another, whereupon it turns out that the writer has used the other word,—it being naturally a further condition of the illusion that the two words have something in common or have at least about the same length. Thus one reads "through" for "though" and for "thorough"; "parent" for "present"; "such" for "some"; "for two reasons" for "for two seasons"; anything towards which the verbal habits lean when a favoring context is thrown into the balance. But, also, as in all such illusions, the mental trend of the moment may cause an erroneous reading of detached words or phrases. Thus, recently, "Upper Montclair" was read by me as "Upton Sinclair," and "Art Shop" as "Air Ship." But the point which I am especially concerned to make here is that whatever may be the provoking conditions for the erroneous reading, the error lies not in some visual process but in the fact that some variety of non-visual imagery is evoked which fails to correspond to the printed text.¹

¹ In all the numerous detailed discussions incidental to investigations of the reading process—discussions of the apperceptive and assimilative processes, of word recognition, of domineering letters, of the apprehension of words as units, etc., etc.,—there seems to have been rarely a clear recognition of the fact that the visual factors

Suppose, however, that a given reader does not have articulatory, auditory, or other non-visual imagery evoked by the visual perception of words, wherein will his illusion consist? We must, I presume, admit that this type of reader exists, although Huey, who canvassed the question some years ago, while admitting the theoretic possibility of the purely visual reader, writes that in practice he has not met with the type.¹ Granting, however, the existence of the type, we must suppose that the seen fragments of the word arouse a wrong escort of visual images, the resulting visual combination being that which now constitutes the illusion. The illusion is no more *perceptual* in the purely visual type than in the cases analyzed before. It is aroused imagery and not perceptual material which fails to square with reality.

Whether there is something analogous to the proofreader's illusion, in the form analyzed above, in other lines of perceptual activity, I am not altogether sure. Aside from possible similar occurrences when objects, rather than words, are imperfectly seen by the rapidly moving eye, the most likely place for such an illusion would undoubtedly be in the auditory field. And the question to be raised is: Does the ear ever get fragments of words which, instead of being centrally supplemented by the same kind of sense material, arouse immediately those visual, or other non-auditory, images which these same auditory fragments might well excite but which they wrongly arouse in this instance? The question is simple enough, but I cannot be sure that in my own case the conditions are ever satisfied. Here is a case in point. Speaking of an ambitious local politician quite unknown to me, a person says: "They say he wanted to try for the Pope's place." It comes to me as: "They say he wanted to try for *Park's* place." Now while the most prominent feature of this illusory hearing was a visual image of "Park," the auditory and articulatory experiences were so mingled with this that I cannot confidently deny that I had a real and immediate auditory perception of "Park." The probabilities

in rapid reading may be relatively subordinate to the auditory or articulatory factors. As far as I can discover, Mesmer (*Arch. f. d. ges. Psychol.*, 2, 279-291) is the only one who has felt the need of appealing strongly to non-visual factors for the explanation of errors. But, so far as I can see, his chief interest was not so much to secure from his subjects introspective analyses of these experiences as to make a classification of the errors of reading in accordance with a prearranged scheme.

¹ See Huey, *Amer. J. of Psychol.*, 12, 297. Cf. also Secor, *Amer. J. of Psychol.*, 11, 225 ff., and Binet, *Année psychologique*, 5, 689. Binet claims that he himself is a purely visual reader.

are that here was an illusion of the commonly recognized variety. Yet I see no reason why any other individual might not find that the essence of his auditory illusions lay in the failure of his non-auditory imagery to square with reality, rather than in some perceptual abnormality.

The appearance of such a form of illusion as I have described is manifestly most readily possible in those sense experiences where the impressions are not of value for their own sake but only as the initiators of imagery or as the starters of motor responses. Now it is the visual experiences that notoriously serve the arousing and initiating functions of every day life, they themselves often remaining in the dimmest fringes of consciousness, while acts performed on the basis of them or meanings gained from them are the consequents attended to. This is to my mind the reason why the form of the proofreader's illusion that I have described is possible at all, and why it is quite possibly the sole case of its kind.

II

But the question forces itself upon one: Is the above analyzed form of the proofreader's illusion in all strictness to be called an illusion at all? Surely it does not conform to the usual type which is commonly illustrated by the mistaking of a hat and coat on a peg for a man. For, in such a case as this, the illusion is entirely *perceptual* in character though only a portion of its elements are peripherally given, while the chief point about the illusions discussed above is that some kind of *imagery* is not what it should be. Whatever fragments of the word are seen are probably seen correctly, but what is seen calls up imagery inappropriate to the actuality of the situation. In a general way the two types of experience may be similarly described. "One *takes* the hat and coat to be a man," we say. And just so we may say: "One takes that word *mispirent* to be *misprint*." The functional aspects of the two situations are, it seems to me, quite identical, for they both lead to action on the basis of what the experience is *taken to be*. All we have to do then is to enlarge somewhat our conception of illusion and admit within it the variety that is here concerning us. To distinguish these, however, from the more common variety they may perhaps be called *Imagery Illusions*. And whether such illusions occur elsewhere than in the visual reading of printed words we must leave at present undecided, with a leaning towards the belief that they possibly may not.

III

It is easy to see that what I have called Imagery Illusions differ in a very important practical aspect from illusions that are more strictly perceptual. For they cannot well be subjected to examination. And herein lies the reason, as I believe, for our inability to make them matters of experimentation. Suppose, in general, that one suspect a given experience to have been illusory. How is one to test the suspicion? Obviously by attempting to pass through the same experience again, with a view to its examination. If for some reason one suspect that the perceived man is really only a hat and coat, the experience is sought once more and then critically scrutinized. But in the case of the non-visual form of the proofreader's illusion this deliberate reinstatement is practically impossible. Let me surmise—on the ground, for instance, of incongruity between the present sense and that of the immediately preceding text—that “misprint” is not the actual word of the text. If now I display any care at all in my examination of the form, say “mispirnt,” that does stand there, I direct my attention to the visual field, get a visual perception of what is there, and then find myself pronouncing the misprinted word as it actually stands before me. I simply cannot get the illusion again in this particular case. For its essential conditions are a high speed of visual activity, with the visual factors only marginally present to consciousness. In his chapter on Perception, Professor James recounts how he read “Mt. Auburn” on an electric car which was actually marked “North Avenue.” Suppose now that at the instant some one had raised the challenge: How do you know that you saw “Mt. Auburn”? The only evidence immediately available in such a case would be the visual, or other, image of Mt. Auburn present in consciousness. But to look back and get a *perception* of Mt. Auburn would be quite impossible. Upon reexamining the printed words, the impression would be too complete to arouse misleading imagery of a non-visual variety. And even on the assumption that the peripherally given fragment of the word is centrally supplemented by visual material, as most of the writers on the matter must believe, how pray is this claim to be tested? A critical rereading of the word will give a correct and not an illusory form. To be sure, one may and one frequently does still overlook misprinted words when rereading phrases or sentences. But I am supposing now that the examination is confined to a single suspected word and that the reading is done letter by letter with critical care. If under these circumstances the word is still

misread, it must be because some letter or letters are still so imperfectly seen that the same imagery illusion is experienced in respect to them as was originally experienced in respect to the entire word. The same inability to subject the experience to an examination seems to prevail in all those tachistoscopic investigations of which we have such a multitude of accounts. A given word is said to be seen, though the actual word may have been misprinted or badly mutilated. How may one test the matter to discover what was peripherally seen and what was supplied by central supplementing? The positive after image, or the primary memory image, or whatever it may be called that the subject of the experiment finds in his consciousness, does not of itself reveal its composite character. And though a second exposure of the letter or word may result in giving a different perception, the experience simply cannot be scrutinized with the purpose of testing its possible illusory character.

From these various considerations we gain an important point of view, it seems to me, for the classification of illusions on the basis of their examinability. At least three main classes may be distinguished.

(1) *Illusions which Persist under Critical Examination.*—This class is well illustrated by the majority of spatial illusions. The Zöllner or Müller-Lyer illusions, for example, may be examined and tested as much as one please without annihilating them. They are stable. They persist. Just so with the illusion of Aristotle; with the apparent lessening of a cutaneous linear distance given by a saw-toothed card-edge; and with most of the illusions of auditory localization. This stability rests undoubtedly upon the fact that the perceptual material is in these cases so largely, if not entirely, peripherally given.¹

(2) *Illusions which under Examination Dissolve More or Less Rapidly, the Illusion Becoming Finally Transformed into the True Perception.*—While sitting some years ago in a small German-American church and looking abstractedly towards the pulpit, I suddenly observed that the latter was surrounded in front by a curved sheet of glass with its convexity towards the audience. For some moments I carefully examined this and speculated upon its use in that place, when suddenly the perception resolved itself into that of a tall candle standing immediately in front of the pulpit. Here was partial stability, but the dissolution of the illusion was bound to come. If the hat and coat of the conventional illustration are badly placed, the dissolution of the illusion arrives

¹ These are called "Pure Illusions" by Miss Calkins. See her *Introduction to Psychology*, p. 184.

rapidly. But all grades of stability may be found within this class. I have frequently had the experience of looking for a lake at the foot of a heavily wooded ridge upon the crest of which I was travelling. Illusions of water surfaces were numerous because of the large white birches standing or lying between me and the foot of the ridge. Occasionally when several such birches were scattered about in the field of vision, this illusion resisted for a considerable time all attempts to resolve it, until some peculiar circumstance caught the eye and shattered the illusion. And, to choose a pair of illustrations from the auditory field, the illusion of running water produced by the rustle of poplar leaves in the forest can only be resolved by the trained and experienced ear; while the illusion of voices in the running stream may be much more readily overcome. The resolution of an illusion may involve a nearer approach to the object under survey, or a shifting of the visual angle, or it may be that some quite fortuitous circumstance brings about the collapse of the illusion and its transformation into what can now be seen to possess more "body" and to be more coercive than the previous experience.

In this class, as in class 1, we see that the grade of stability parallels the amount of peripherally given material in the perception.¹

(3) *Illusions which Elude Examination Altogether Just Because any Attempt to Regain the Experience Produces the Correct Experience.*—Here belongs the proofreader's illusion in the form described in this paper. Such an illusion is not subject to critical review. One cannot go back to it, with the intention of testing it, without destroying its illusory character altogether. Here we have the maximum grade of instability, and here the essence of the illusory experience consists of imagery initiated by but not compounded with peripheral elements. These are the *imagery illusions*.

All these classes of illusion are identical in function in that they lead to erroneous motor responses, but it seems worth while to display their structural differences.²

¹ These are called "Mixed Illusions" by Miss Calkins.

² The reader may be reminded of Binet's classification of illusions on the basis of their rectifiability, the latter being accomplished by appeal to another sense than the one conveying the illusion. On this basis Binet distinguishes three types of illusion, the completely rectifiable, the partially rectifiable, and the unrectifiable. (La rectification des illusions par appel aux sens, *Mind*, 1884, 9, pp. 206 ff.) It will be noted that a classification on the basis of examinability sets out from a quite different standpoint. Binet's concern was to describe the various grades of success with which illusions may be banished. The problem of the present paper is in certain respects the reverse of this, to discover, namely, how long an illusion may be retained as such for purposes of inspection.

GENERAL REVIEWS AND SUMMARIES

HISTORICAL CONTRIBUTIONS

BY WOODBRIDGE RILEY

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The most important historical contribution, since our last general review, has been J. Mark Baldwin's *History of Psychology*, reviewed in the September number of the BULLETIN. A briefer supplemental account is given in Krueger's article (4) which expounds "the aims and tendencies in psychology," especially in their German-American relations. Thus the first laboratory for experimental psychology was established by Wundt, whose first assistant and cooperator was Cattell. For the latter the claim is made of holding the first special professorship in psychology in the world. While the United States can boast of a more extensive system of psychological instruction than any other country, with particularly valuable investigations in animal and social psychology, the Germans are not particularly conversant with these facts.

This German-American account is in turn to be supplemented by the French (6).

So much for the general aspects of psychology. For more particular views we take up the study of four eminent thinkers—William James, Fechner, Wundt and Kierkegaard. Knox (3) explains that while James was led on from psychology to philosophy, it was precisely his psychological insight that enabled him to discern the personal sources of the big philosophical antitheses. He was not deterred by a priori distinctions between logic and psychology, by the assumption that our aim is purely impersonal and objective, but held that personal vision and practical make-shifts determine metaphysical theory. He challenged the intellectualist axiom that the parallel lines of knowing and doing must never meet. This makes his *Principles of Psychology* as valuable a handbook of ethics as it is of logic. Thus was early laid in psychology the foundations for the coming pragmatism. And so, conversely, James invites us to treat our moral and religious aspirations as methodologically on a par with scientific categories.

As with James so with Fechner. Angell (1) points out in the case of the German a curious tendency towards a practical mysticism. From the physicist comes forth the philosopher, and the laboratory has given place to the oracle. Believing that the reality of the world must accord with what is reasonable, Fechner saw clearly that this reality could not be deduced by dialectics, but that it must be worked out as one works out final questions in physics, namely by generalization and by analogy. In other words the purpose of Fechner was an inductive metaphysics or "Metaphysik von Unten." Now James, who twenty-five years ago gave his official opinion that the proper psychological outcome of Fechner's work was "just nothing," has made the *amende honorable* in a generously sympathetic essay in the *Pluralistic Universe*.

Meumann's (5) account of the life work of Wilhelm Wundt is noteworthy for two features, its arraignment of German officialdom for its neglect of a great thinker and its praise of American psychologists for spreading the fame of the master. The former fact is explained as due to Wundt's south German independence of bureaucracy, the latter as due to his endeavors to make his work both scientific and practical. To Americans brought up on the old introspective "mental philosophy" the new experimental psychology was a welcome relief. In place of the old static view of the mind came the doctrine of development; in place of the study of the normal adult was offered animal, and child, and race psychology. So what Fechner had started at Leipsic, Wundt enlarged and America spread.

James's pragmatism and Fechner's mysticism had a similar two-fold aspect. Both were scientific and both sought truth under the analogy of the self. So was it with the system of Kjerkegaard as his compatriot Hoeffding (2) shows. The Danish thinker's philosophy had a double quality, being both personal and scientific. While subjectivity is the avenue of truth, the world in which we live is a world of scientific approximation. And James's pluralism is matched by the statement that the personal world represents not a world, but a plurality of worlds resulting from the different points of view of personalities. Here arise four chief types: there is the *aesthete* who draws a tangent to the circle of life along the line of passing pleasures; there is again the *ironist* who, knowing how to distinguish the interior from the exterior, strives to shelter his inner life against the changes of the moment; there is next the *moralist* who enters into positive relations with other men

and endeavors to fulfil his duty; there is finally the humorist who, being sadly affected by the contrast of finite and infinite, is forced to look upon life as more or less of a joke. All this reminds one of James's "types of thinking" from the man who "carves out" order to him who considers the universe a vast "grab-bag." Between the American and the Dane there is, then, final agreement in respect to the doctrine of discontinuity, the old idealistic continuity being supplanted by the view that both the psychic and the cosmic life proceed by leaps, *Natura per saltum*.

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GENERAL PROBLEMS; MIND AND BODY

BY WALTER T. MARVIN

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The prominent subjects in the current discussion of the foundations of psychology remain the nature of the mental and the formulation and limitation of the psychologist's problem. The most important contribution to these subjects has been made by Holt (11). His book endeavors to establish two chief conclusions. First, the mental is not a simple stuff which defies analysis and so definition in terms of the non-mental. On the contrary the mental is a complex which can be analyzed; and if so, it must reveal as its components, entities that are relatively simpler and therefore non-mental. Second, cerebral physiology must be freed once and for all "from its present mysterious and retarding association with metaphysics." Cerebral physiology does not raise any problem fundamentally different from those raised by other departments of neural physiology. Yet the traditional belief coming to us through Descartes from the middle ages has so possessed our minds that even our foremost physiologists are "rendered circumspect, tenta-

tive, and, as it were despairing because they cannot hope that their mere physiological methods will avail aught in the cerebrum—the dark throne of mentality." To return to the first conclusion: Modern logical analysis is forcing us to outgrow that ancient and crude conception of the physical world which pictures it as a cloud of minute Democritean atoms or tennis balls, and is giving us in its place systems of purely mathematical entities, definable in mathematical terms and explicable through mathematical formulæ. Instead of the physical being ultimate, analysis brings us beyond it to that which is logically simpler. Indeed it is this logically simple which constitutes our largest and all inclusive universe of discourse. It is a realm of pure being, for all that is required of any entity in order to be a member of it, is that the entity should *be*, that is, should be a possible object of discourse. It is here in this universe of discourse that logic forces us to begin the work of definition. Starting here we can define the mathematical, the physical and, as Holt endeavors to show, the mental. The mental is a certain selection out of, or cross section of, this realm of pure being, distinguished from other cross sections (for example, the physical) by being that to which the nervous system specifically responds. As members of this larger world of discourse the very same entities can be both physical and mental, and can be within the field of two or more minds. To return to Holt's second conclusion: The nervous system is simply an organ of response. This is all that the definition of the mental demands of it in the name of psychology. Santayana (14) finds Holt's metaphysics too Platonic; "it leaves us in the air." Consciousness is not merely a selection of objects, for attention bestows on the conscious field a "sort of intensity or actuality." Is not "what the nervous system selects thereby suffused with a specious unity, emphasis, or luminosity which it did not have before?"

Less general than the problem of Holt's book is the issue raised by the behaviorist. This issue has been discussed by several writers during the past year. Watson (17) in his recent book has repeated his defence of behaviorism.¹ Bode (2, 3) makes the point that if psychology is to be regarded as the science of behavior, "we are bound to reinterpret the category of behavior." We must distinguish between automatic and conscious acts. "Conscious response is a process of organizing or readjusting different simultaneous responses which interfere with one another." It is a

¹ Cf. *PSYCHOL. BULL.*, 1914, 11, 1.

response "which seeks and maintains the stimulus necessary for further response." Its characteristic trait is "that stimulus and response develop concomitantly." Adopting this distinction between automatic and conscious response we may accept behaviorism. Crile (7) argues that granted the mechanistic theory of life psychology must be redefined. It is the study of how in the course of man's phylogeny and ontogeny his responses have become determined by environmental stimuli. The evidence afforded by the reflex arcs in man shows clearly that environment is indeed the author of his mental nature. Frost (9, 10) argues that "if no process can experience itself, be within itself both subject and object" there exist no grounds for labelling any process "psychic." Neural arcs never respond to themselves but to stimuli from without the body or to neural impulses passed on from lower arcs. Psychology gains nothing by speaking either of an elementary psychic process or even of a knowing function, for it can express in a better way "the reactions or awarenesses" on the part of higher neural processes of lower neural processes. Against the extreme behaviorism of Watson and others Marshall (12) protests that though there is without question and of right a science of behavior, still there are existences of another order than the physical order, the mental order, and "from time immemorial it has seemed worth while to some of the most powerful thinkers among men to investigate the nature of, and the relations between, these existences in the mental order." Dewey (8) discusses the relation of psychology and philosophy and expresses a certain hope and a certain fear regarding the behaviorist movement. Our present psychology is not founded solely upon matter of fact, for it has inherited from the Middle Ages through Descartes and Locke a general theory. It is now outgrowing this theory and already many of its developments "decline to lend themselves to the traditional rubrics." Given a generation of teachers and students trained in the behaviorist point of view, the change from the introspectionist psychology will profoundly change the spirit and tenor of philosophical discussion, chiefly by relegating some "problems to the attic in which are kept the relics of former intellectual bad taste." But behavior must not be limited to the activities of the nervous system, for behavior "would seem to be as wide as the doings and sufferings of a human being." The distinction between routine and whimsical and intelligent—or aimful—behavior would seem to describe a genuine distinction in ways of behaving. Again we should not

ignore the social qualities of behavior. In short, behaviorism must break loose from its prepossession that behavior is solely something going on within an organism and take behavior as it is found.

The nature and field of psychological science are discussed also in articles by Creighton, Natorp, and Sauerbeck. Creighton (6) protests that the primary psychological interest is not that which is sought in physiological psychology. Rather it is that which "seeks to understand *individuals*, our own mind and that of others; and to understand individuals is to know them from the inside as centers of experience," for the person is not a series of phenomena but an individual, a self. We must study the mind not by the analytical and abstract methods of science but through an insight into the concrete form of the mind, the living mind as it is presupposed in most of our concrete dealing with our fellow men, and in our explanation of history. "The life of mind is a realm of judgment, value and appreciation, a life of activity and interpretation." Closely related to this conception of psychology is that of Natorp (13), who would carry psychology way beyond its limited field as one of the special sciences and offer it as its province the whole realm of life and life's interests. Sauerbeck (15) finds, over and above the differences in the objects studied by the several existential sciences, differences in method. Psychology stands out from the other sciences by having in addition to their methods one peculiar to itself, namely, the teleological method. This method is indeed in many respects an imperfect one and becomes scientific only in combination with the other methods, which are respectively, the methods of exact science, the empirical or descriptive method, and the historical or evolutionary method.

The mind-body problem is the subject of the presidential address by Warren (16). Though science is not yet ready to adopt a metaphysics of mind and matter, "some working hypothesis of the psychoneural relation is needed." "The double aspect view (monodualism) seems to fit the conditions best." For this view Warren finds an interesting and apposite analogy in the surface-mass relation of a material body. "Mass and surface change conjointly; they are inseparably bound together; they are two radically distinct aspects of the same thing." If the mental and the physical are two aspects of the same thing then it follows that the uniformity found in the physical obtains equally in the mental sphere. Human volition and human reasoning and teleology can be explained quite in accord with the mechanistic processes of

nature. The double-aspect theory has also an important bearing upon the issue raised by behaviorism. "Psychology should embrace both the inner and the outer aspects of experience." The relations between the individual and his environment can be studied objectively as behavior, or introspectively as consciousness. On the one hand, the study of behavior checks up the data of introspection and is essential to the understanding of genesis; but on the other hand, introspection "has disclosed uniformities among mental events," and the conscious life, that introspection reveals, requires scientific analysis and study as much as the objective world revealed by consciousness.

Further studies of the mind-body relation are those of Bleuler, Dürr, and Carr. Bleuler (1) concludes that the laws of the central nervous system and of the mental stream are identical and so that there is no fundamental difference between psychical and physical causation. The differences usually noted are not differences between psychical and physical causation but those between simple and complex and between direct and releasing causation. The releasing and blocking of reaction in the mental field is to be conceived of as a process analogous to the switching of an electrical current or rather as the lessening or increasing of resistance to the passage of the current at a switching point. A new unaltered edition of Busse's book (4) has appeared with an appendix by Dürr in which he gives an elaborate analysis of the mind-body problem and expresses his decision in favor of interaction as this doctrine is formulated in his analysis. Finally Carr (5) gives two reasons why the mind cannot be produced by the brain. "One is that it is impossible to explain anything as an effect unless we can regard it as strictly commensurate with the cause, and mind is not commensurate with cerebral process. And the second is that the consciousness which arises in connection with cerebral process is not consciousness of cerebral process but of something which is altogether independent of cerebral process, something existing in a different space" and time.

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CONSCIOUSNESS AND THE UNCONSCIOUS

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More and more dissatisfaction is becoming evident with the traditional attitudes toward consciousness. Watson (18) restates in the first chapter of his book the position taken in his papers of last year, and presents an imposing array of facts which the behavior method has yielded in the field of animal psychology. Frost (6, 7) pleads for a use of the term "awareness" with a physiological, rather than with its usual mental, connotation. When, for example, the pupillary reflex takes place, we may consider that the eye-mechanism is aware of the stimulus. When the activity of such lower arcs leads to the stimulation of higher arcs, the latter may be said to become aware of the former. Such physiological processes are themselves "consciousness at the moment, completely described." There is no necessity of assuming an additional

realm of psychic realities, though, to be sure, the psychologist may still continue to use his old terminology, and to speak, for example, of sensations, which are not, however, to be regarded as first, but second, things in the way of consciousness. The paper of Burrow (1) advocates the similar thesis that the "mind is the function of the body-complex presented in the reaction of the individual as a whole." In order for psychic states to arise there must be a synthesis of two or more stimuli into a simultaneous unitary reaction. Such reactions do not cause, but are themselves, consciousness.

Dewey (3), speaking as a teacher of philosophy, deplores the fact that the student of philosophy comes to his work with a belief in a distinct psychic realm of existence, unique and private. That such a condition of affairs exists is due to the philosophy of Locke and Descartes, which is not yet outgrown by psychology, though long ago discarded by the philosopher. If the behavior psychology in its extreme form were to prevail, the case would, so far as the teacher of philosophy is concerned, be little better, since the behaviorist is no less dominated by dualism than is the introspectionist. Carr (4) takes a radically different view. For him, mental and physical are absolutely incommensurable. Mind and brain touch at one point only, like the circle and its tangent. But Warren's paper (17), taken in conjunction with those noted above, shows that Dewey's criticisms of the position of psychology in general are not applicable to the views of all psychologists. Consciousness and the nervous system constitute, for Warren, a single series of processes, "observable in two ways." Mind is not an epiphenomenon, but all organic life presents a "double aspect." For the mental side attaching to the functioning of the lower centers and to the activities of the simpler organisms, he suggests the term "protoesthesia." Such a double aspect view allows psychology to adopt mechanistic views, and provides a place for the study of behavior while not ruling out introspection. Psychology then becomes the "science of individual experience," regarded from both points of view. Hobhouse (8) is equally convinced that physical and mental cannot be sharply set off against each other. Consciousness is too narrow a term to serve the student of mental evolution; it is better to speak of "correlations," including all sorts of vital activity. The lower organisms make their correlations in terms of present factors only. Gradually these develop in such a way as to make possible correlations with factors not immediately present. Such complex types of correlation are just

what we mean by mind. The mental universe, at first incoherent and confused, is reduced to logic and order under their influence. Mind in this sense is a real factor in evolution, though not the only one.

The most thoroughgoing treatment of the problem of consciousness from the philosophical point of view is the work of Holt (9). In his system we are presented with a universe made up of "neutral entities," which themselves are neither mind nor matter, but the possibility of both; a universe derived deductively from pure, empty Being. Mind is not the basal stuff of the universe, for it is too concrete and limited. Our ideas are said to "represent" objects. But representation means at least partial identity; if it were adequate, identity would be complete. It is incorrect to say that we are conscious of objects; in so far as representations are adequate, consciousness and its objects are identical. Consciousness is simply a particular complex of objects which themselves are neutral, a sort of grouping which is one of a series into which objects may enter, and which are generated deductively, the more complex from the simpler, the universe being a "single deductive system." Objects—and the term includes all sorts of qualities, relations, pleasantnesses and unpleasantnesses, and so on—are precisely the same whether they appear as consciousness or in any other way. They become consciousness through the activity of the nervous system, which responds to qualities usually regarded as subjective and abstract, but which are really neutral, as well as to "physical" stimuli. Such a consciousness is of course without an abiding principle of unity, as well as without that privacy which we have been accustomed to associate with it.

Santayana (13) feels that we have in such a conception the coming philosophy, though not one which is coming to stay. After all, the realist does make a distinction between consciousness and its objects, since he assumes that they are selected and formed into individual groupings by the nervous system; unless, to be sure, he assumes that consciousness is the primal stuff of the universe, in which case he finds himself back in idealism.

MacDougall (11) reminds us that the interpretation of physical changes in terms of mind presents difficulty even in the normal adult. The same stimulus may or may not become conscious at different times, the same movement may or may not involve the higher centers. Even in man the question must always be answered in terms of the whole situation. The same problem is met in a

more acute form in abnormal and immature individuals, and in the animal series. Four criteria of the presence of consciousness have been proposed. Mind may be regarded as co-extensive with matter; as present only when complexity of structure has reached a given point; as indicated by complex or modifiable behavior; as attending imperfect adaptation. In attempts to apply such criteria a careful distinction must be drawn between consciousness as a unity and as a complex of phenomena. The latter view is that of science in general, and should determine the statement of the problem. We should inquire not about the distribution of consciousness as a formal unity, but about the appearance of the several mental factors.

Feingold's paper (4) is an attempt to demonstrate experimentally the sort of environment that is fittest for the continuity of consciousness. Groups of postcards were exposed to ten subjects. Certain of these cards had already been graded in terms of similarity, and each exposed group contained one such standardized card, these being exchanged from group to group, and the observers required to note substitutions. The results showed that "an environment which is a mixture of about 30 per cent. homogeneity and 70 per cent. heterogeneity is the most ideal environment for the continuity of consciousness."

Turro (14), in an interesting book, works out in detail his theory that consciousness develops in the individual, not in response to external sensory stimuli alone, but primarily under the influence of hunger, which, when satisfied, gives rise to trophic or internal sensibility, itself in turn potent in the early stages of mental development.

The most important contribution of the year to the discussion of the subconscious is the book by Prince (12). Its title is somewhat misleading, since the author restricts in practice his definition of the unconscious to include only latent neural dispositions. Such "neurograms," when stimulated, may give rise to processes which are conscious or subconscious. The latter again may be purely physiological, or may be correlated with psychic, though not conscious, factors. Such co-conscious processes may include "true perceptions, memories, thoughts, volitions, imagination, etc." Conserved experiences may undergo subconsciously the greatest elaboration and systematization, get organized into complexes, enter into the mechanism of our conscious thought, determine meanings, give rise to convictions, attitudes, visions, dreams,

obsessions, phobias, dissociations of personality, conflicts, and so on. Many examples of the functioning of such processes are given, for the most part from the author's own rich clinical experience. The Freudian school comes in for its share of criticism, while some of its conceptions, notably that of the possibility of a rational interpretation of dreams, are in principle accepted.

Freud (5) sums up his now familiar theory of the unconscious. Studies of hypnotic phenomena prepared the way for dynamic theories of the unconscious. The paper of Jelgersma (10) is also a discussion of Freud's theory of the unconscious, with particular reference to dreams. Troland (15) applies the same conceptions to psychical research. Those who hold, as does Freud, that the subconscious is immoral, possessed of brute cunning and a perfect memory, will naturally see in telepathy, spiritism, and the whole range of veridical phenomena, manifestations of its activity. This view is applied to the discussion of typical phenomena. Wanke (16) feels that a psychology which does not take account of subconscious phenomena must always remain incomplete.

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DREAMS

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Bergson's original lecture upon the subject of Dreams (March 1901) has found a translator and appears now in book form (2). Written a few months after the publication of Freud's *Traumdeutung*, this essay of Bergson's possesses mild historic interest, and the eminent name upon the binding will insure readers, but no essential contribution is here made either to fact or concept. Such a naïve statement, for instance, as that "in a few seconds a dream can present to us a series of events which will occupy, in the waking state, entire days," exposes the data of the book to suspicion.

To infer from the bulk of recent literature on the Dream, dreaming is distinctly in vogue. Those who brave Freudian analyses are busily concerned in codifying their dream life. Most current books and brochures do not remain neutral, but deduce conclusions frankly either in support or condemnation of Freud. Supporting articles take the form, for the most part, of further dream analyses; while those who take issue with Freud do so both upon logical grounds (5) and upon the basis of experiment (3, 13).

Four important books of the last year or so have reference to dream experience. The new edition of Coriat's *Abnormal Psychology* (6) devotes three complete chapters and much other discussion to sleep and dream problems. Hitschmann's monograph (8) gives a summary of the Freudian viewpoint with one chapter devoted to the Dream. Brill's translation of the third German edition of *Die Traumdeutung* (4) now puts this material, first hand, before the English reader. Finally, Prince's fascinating book, *The Unconscious* (13), has a wealth of dream material, with emphasis upon non-Freudian factors.

A few dream studies are of the questionnaire or statistical sort; others give the results of investigation of dreams personally experienced. Among the former, Terman and Hocking (14) investi-

gated the sleep of 2,692 school children from six to twenty years of age. They found surprising lack of correlation between the amount and character of sleep and dreams, on the one hand, and either school success or nervous traits on the other. Check experiments upon abnormal subjects gave similarly negative results (14, 15). With five subjects Thompson (16) finds that dream imagery is similar both in character and intensity to that of waking life; that sensory stimuli do not cause the dream, playing only a minor rôle in its formation; that condensations occur more frequently in visual than in auditory material and, in general, occur most often in terms of the predominant imagery of the subject experiencing them. Finally he claims that critical thought and reasoning may and do occur in the dream, though rarely. When such higher processes take place they exhibit all the clearness and logical consistency of waking trains of thought.

Klages (9) publishes the first of several promised voluminous speculations as to the character of dream material and its mutual relations with waking consciousness. It would appear that there is abundant supply of this sort of stuff already at hand without the new infliction. After all as Bergson writes: "We need something more than theories. We need an intimate contact with facts. One must make the decisive experiment upon oneself." Considerable work of this sort has been accomplished. Aall (1) agrees that dreams may possess entire consistency within themselves and yet not be consistent if viewed reflectively upon waking. For him the dream is often actually motivated by physical stimuli, in certain types of dreams usually so, for instance auditory dreams are occasioned by genuine sound stimuli. Such stimuli are no more disturbing to sleeping than to waking consciousness, but for the former there is no check or norm: this occasions the frequently intense and hallucinatory character of the dream.

Köhler (11) cites a dream of intense religious feeling aroused while the dreamer is describing a musical composition. The significant thing here is that while the ideas and feelings which the music expresses arouse religious ecstasy, there are no auditory images. Incidentally, the Freudian wish-fulfilment interpretation is discredited as a universal principle of explanation. In a more extended investigation of his own dreams elsewhere (10) he concludes that where sense data are complex, its imagery rarely occurs in the dream. Reading and writing, for instance, require for their adequate performance integrations of various diverse

mechanisms, and in consequence dream images of these acts are rare and imperfect. Dreams of a given night show many interrelations, but usually all possess an hallucinatory character. He agrees with Frost (7) that between dreams involving total change of scene, there is never an absolute gap, but some traceable thread of association remains. Finally, for him, dream and waking affective processes are essentially of one sort and not two. Feelings, that is, as they appear in the dream, are real feelings and not merely images of feelings.

Frost (7) finds a characteristic dream-form, which if graphically represented would take the shape of a pulse- or breathing curve, *i. e.*, a given dream episode is launched abruptly and full-blown, but begins promptly to undergo disintegration and condensation, leaving a final trace only to act as occasion for the following phase or episode. However irrelevant the second phase or dream, and however great the apparent gap between the sections, some nexus of imagery or word was invariably discoverable. Further it sometimes happens that an emotion or affective process, for example a fear, may persist through several episodes, coloring them all. In such cases there is likely to be an affective summation: the feeling eventually awaking the sleeper. Finally, with condensation, meaning values change, and what was originally important becomes inconsequential.

Kollarits (12) also finds fear an important factor in dream determination. With the insistence of Freudians upon their sex symbolism, he does not agree, accusing them in substance of the psychologist's fallacy: their wish is father to their thought, and not their dream! He believes, indeed, that dreams may be the realization of both wishes and fears, of both the conscious and unconscious variety, but he insists that dreams frequently occur that cannot be explained as either, but are quite indifferent: a view held by the majority of Freud's critics. Berguer (3) from a dream analysis of his own suggests that some at least of the disguises of the dream may not be the conceptually motivated repressions of a censor, but may be due rather to what he terms a verbal jumbling: to the manner rather than the matter of dream expression. Even if the dream comes, as do his, in terms of verbal imagery, as though the dreamer were either speaker or audience, and so became liable to confusion in expression, it does not appear why the Freudian factors may not also be present.

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INTROSPECTION AND GENERAL METHODS

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The articles assigned to this rubric are of widely various content. Discussing the method of introspection, Bode (4) argues that analytic observation necessarily alters the experience it was intended to observe. "Mental states" are fictions, and introspection cannot possibly consist in the discovery of elements of mental states. But "the legitimate purpose of the analysis is to furnish, not only a new experience of the situation in which the earlier experience occurred, but an experience of such a kind as to reveal the causes or conditions which were then involved, but which did not constitute a part of the experiential content" (p. 89). Also the uniqueness of an experience is best apprehended only after a

later, reconstructing experience in which some of the original aspects have been further developed.

Working with introspections of the meaning of words, and later of aphorisms, Ogden (7) found that although his four observers were able to take the desired attitude in the case of the meanings of words, giving a truly psychological description of the content of the experience, they were practically unable to do this in the case of the aphorisms, but lapsed into information about logical meanings. He concludes "the method of studying the thought-process by the arousal of complicated experiences is unsuited to a description of content" (p. 407), though it does furnish data on "thought-relations and their dependence on associations" (p. 411).

Replying to attacks against certain studies which used "the method of examination." Titchener (10) maintains the value of the results obtained, and, while he admits "it does not appear that the method of questions will ever avail, of itself, to settle disputed questions of a systematic kind" (p. 436) and can hardly be given "a rank with the approved methods of the science," he still asserts its value for obtaining a first survey of new fields and also incidentally as an educator for students.

The possibility of getting reliable introspections from dementia precox patients was studied by Boring (5) with eight such subjects, who learned a maze; control data were obtained from three university subjects, and from two twelve-year old boys. After discussing the various criteria of reliability, and his method of grading the data, he concludes that the reports of these insane patients are "of about that degree of reliability that is found in reports made by untrained observers with little education and a poor command of language, and appear to differ from these reports in no characteristic way other than in the introduction of irrelevant material" (p. 170). But he also says that at least seven of the eight dementia precox patients were also "uneducated men with very poor vocabularies" (p. 157).

Baade (1) found it possible to obtain valuable, immediate introspections upon interrupting an occasional one of a series of experiences, using preferably a visual signal, which was variously timed by the position of a lever in the path of a pendulum released as the experience began. He also (2) tried a dictation-phonograph for recording introspections, but found that, even with such refinements as a speaking-trumpet for a mouth-piece, the practical utility was slight.

Read (8) considers the comparative method is always "to construct or confirm an elaborate hypothesis concerning a series of antecedents that have been lost" (p. 48), thus discovering the probable causes of observed modifications. Application of the method to psychology is chiefly hindered by present ignorance of the stages of mental development of the various animals, and consequent uncertainty as to what cases may allowably be used as parallels.

To determine how far the preference for certain numbers operates to produce errors in estimating small fractions, Bauch (3) obtained series of estimates of tenths of a millimeter on a micrometer-like apparatus, and also estimates of fractions of a decimeter in centimeters and millimeters. All of his ten subjects showed errors of the same type, and he found that in careful estimates of such small fractions, when equal numbers of each tenth are actually given, the "border tenths,"—1, 2, 8, 9, 0—are judged about 15 per cent. more often than they are given. However, when the estimate is a rough one, approaching a guess, the preference is for 0, 5, 8, 2, in this order. And in wholly free choice of a decimal, the border decimals are less frequently chosen than the others. A tentative explanation of the first conclusion is suggested.

Lyon (6) reports a simple method of scoring repeated lists of three-letter syllables and words.

Schwartz's article (9) is something of a curiosity. The problems of psychology are ultimately the problems of physiological mechanics; for all mechanics the calculus should be replaced by "a system of relative values," which would allow a mathematical formulation of the relation between idea and object. From the original proportion "object : idea :: stimulus : sensation" one can derive the equation "object \times sensation = idea \times stimulus."

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BIBLIOGRAPHICAL

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The general psychological bibliography compiled by *Psiche* (1) was completed in the second volume of the magazine. The topics included in the later installments are religious, legal, and social psychology, psychotherapy, and comparative psychology. On the whole this bibliography is disappointing. As a reference list for the beginner these selected titles with brief analyses of contents have some value, but the works included are neither numerous enough nor chosen with sufficient care to afford assistance to the average psychologist. Social psychology includes only 64 titles and animal psychology 133. Of greater value to the worker in psychology is the annual philosophical bibliography published by the *Rivista di Filosofia* (5). The list for 1912 includes 94 titles in psychology, all Italian works. Some of the references are not readily obtainable from other sources.

Several bibliographies on broad general topics have recently appeared. Among these Berguer's list (2) of about 1,300 titles on religious psychology deserves especial notice on account of the thorough way in which it covers the field. The titles are largely of works published within the past decade, but there is no time limit and we note several references earlier than the nineteenth century. Attention should also be called to the report of literature covering the whole field of psychiatry, published annually by the *Allgemeine Zeitschrift für Psychiatrie* (6).

Doll (3) gives a well-selected list of about 150 titles on feeble-mindedness and kindred topics, which should prove particularly useful to psychologists working on retardation and mental tests. Important works are starred. Kohs (4) gives 254 titles of books and articles dealing with the Binet-Simon scale. The contents of the more important works are mentioned in brief notes, which enhance the value of this list considerably for reference purposes.

Titchener and Foster (7) in two further supplementary lists bring their bibliography of Wundt's writings down to 1913, including part of 1914.

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APPARATUS

BY C. E. SEASHORE

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Black (1) recommends the use of a miniature electric lamp in the color capsule of the McHardy perimeter. "With the electric perimeter absolute spectral colors are used," is an expression which shows the author's conception of the physics and psycho-physics of the problem. He says nothing about how to produce these "absolute spectral colors."

The rather elaborate and cumbersome aesthesiometer described by Gemelli (2) is probably more complicated than necessary.

Lubmann (3) gives an illustration of the naïve attitude of the aurists toward the measurement of hearing ability. The aurometer is a watch suspended on a graduated bar attached to head band, all of which is much worse than the mere holding of the watch in the hand.

The apparatus described by Dunlap (4) for the measuring of slow reaction times consists of "(a) an Ewald chronoscope, (b) a 54 dv. electric fork with two mercury contacts, (c) two voice keys somewhat similar to the 'Schallschlüssel nach Roemer,' but simpler, (d) a double relay of my own design, and (e) a master switch, which I designed for general purposes, but which has not been described

in detail." The Ewald chronoscope now on the market and here recommended is much superior to the one that was on the market twenty years ago. The reviewer has found it to be by far the best of the small and relatively cheap devices for time measurement.

Snyder (5) sums up his description of certain technical devices and procedures for the equipment and operation of a thread-galvanometer as follows: "A description is given of a simple and perfectly safe disposition of the parts and wiring of an inexpensive main switch-board. Certain modifications of Edelmann's photo-registration drum are briefly described which enable one to use it for both slow and fast speeds. The velocity of the camera-drum may thus be varied at will from 4 mm. to 2 meters per second. A combined automatic breaking key and photo-stimulation signal is described which may be attached to the photo-registration drum. The above devices have been used successfully, and thus at comparatively small expense, with the small electro-magnet thread galvanometer, Edelmann construction."

Those who are interested in the installment or the adaptation of apparatus for use of spectral colors in laboratory and clinical work will find very helpful suggestions from Trendelenburg's account (6) of the simple and serviceable arrangement designed by von Kries.

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TEXT-BOOKS AND GENERAL TREATISES

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The year has been rich in text-books and introductions. Watson's *Introduction to Comparative Psychology* (14) is probably the best text-book of animal psychology that has yet been written. Its usefulness is not, however, limited to that field, and it will,

without doubt, be welcomed by all psychologists who are at all interested in an objective psychology. In the opening chapter the author states his objection to introspective psychology, and outlines clearly his behavioristic program. He says that "psychology, as the behaviorist views it, is a purely objective, experimental branch of natural science which needs introspection as little as do the sciences of chemistry and physics."

A chapter at the beginning is devoted to a sketch of possible problems. Experiments in instinct and habit more than any others are in need of careful field observations. A long chapter is devoted to methods, and contains illustrations and descriptions of the latest and most promising apparatus. In the section on instinct much material is drawn from the author's most interesting work upon the noddy and sooty terns. The several theories as to the origin of diversities are presented in a most intelligible form. Next follow several chapters dealing extensively with habit and the learning processes. This part ends with a description of the clever horses which aroused so much discussion in recent years. Language habits form a distinction between man and beast and this subject occupies a short chapter. The author remarks that "it is futile to search for imagery and reasoning in animals, but scientists might well investigate the possible development of the language habit in the anthropoids." The last part of the book is devoted to experiments in the different sensations. In all the fields treated in the Introduction the most important experiments are briefly but clearly described. The chapters are supplied with short, well selected bibliographies.

Professor Münsterberg's psychology (9) is original not only in many of the ideas which it contains but in the extensive field it covers and the arrangement of the material presented. The conventional scope of the text-book is covered by the first half of the book. This deals with the individual processes both simple and complex, and is preceded by a chapter on the fundamental philosophical principles. The book continues with the elementary and complex processes of the social group. Thus far the explanation has been a causal one. Although the mental is non-spatial and admits of no causal relation, yet psychophysical parallelism allows us to explain mental facts by means of physiological processes. There is, however, another treatment possible. Man is moved by motives. There is the realm of values where a teleological explanation is applicable. A description of mind from this point of view is

given in the second part of the book which is called "Purposive Psychology." The third part is on "Applied Psychology" and includes educational, legal, economic, medical, and cultural psychology. The book is intended for an elementary course; the subject is broadly treated, and every aspect is presented to the student in as clear and interesting a manner as possible. It is a book not only for the teacher, but for all who desire a concise account of the author's views on all the problems of his science.

Ogden (10) has felt the need of a book that would enable the student "to connect his psychology with every day life and . . . to apprehend the bearing of his science upon philosophy, education, sociology, and biology." He also thinks that we should incorporate in our psychological system the more recent findings of the thought process experiments. In consideration of the first need the author has mentioned only the most important facts and in the simplest possible language. There is no physiology, psychophysics, or reference to laboratory work. Few theories are discussed, nor are references given except a short list of books for additional reading. Consistent with the second part we find frequent mention of the imageless contents of mind. Like Münsterberg's book, we find a purposive as well as a causal point of view. So many topics are treated in this rather short book that each can be given only a very small space. In the analytical part we find sensation, image, affection, and thought treated; in the synthetic section attention, memory, perception, ideation, reaction and emotion. The last part of the book, under the title of the "Issues of Psychology," deals with the directive tendencies of mind, the relation of mind and body, personality, which includes the ego, dreams, hypnotism, telepathy, insanity, etc., and character, which includes the logical, esthetic, moral and religious character.

Messer's psychology (8) is principally descriptive in the strict sense of the word. Most of the book consists of data obtained from the direct observation of conscious processes. That which is given indirectly comes for the author under the head of explanation. There is only the merest reference to physiology and little to physiological psychology. Much attention is given to definitions and there is an extensive historical background. The attitude towards existing theories is for the most part conservative and many problems are recognized as being still unsolved. The author does not attempt to be original nor has he a system to present. One of the chief values of the book is the excellent idea it gives of

the most promising work of the younger generation of German psychologists. The book is distinctively German psychology; and as in the case of any scientific book which almost totally neglects or deprecatingly pushes aside foreign production, it bears a provincial stamp.

The author begins with an account of the chief sources of the science: the practical knowledge of human motives, religious belief and the biological explanations of life. There is also an historical sketch of the principal problems such as apperception. The methods of psychology have been the analytically descriptive, the experimental, and the Würzburg method, which is a combination of the first two. Unconscious mental processes such as dispositions are admitted and considered of much importance as a means of explanation.

It is interesting to note that one of the first of the Würzburg school advocates a combination of the introspective and objective methods. An instance of the neglect of foreign literature is the remark that it is generally admitted that feelings can be observed. Against sensationalism it is contended that experiences such as judging and willing cannot be explained from a sensational basis. The description of sensations occupies little space, much attention being given to Katz's work on color and Köhler's on tone. In the explanatory part such facts as the Purkinje phenomenon, contrast, thresholds, and theories are included. The psychophysical methods are briefly treated. Images are called centrally aroused sensations. There is a good account of synesthesia and its theories. In the treatment of perception, which for the author contains a conceptual element, he cannot avoid some epistemology. In the interesting discussion of size and form there are frequent references to Bühler's work on space and Wertheimer's recent experiments on subjective movement. The controversy between a genetic and a nativistic theory of space belongs to child psychology. In the adult's consciousness space is directly given. In discussions of the categories such as identity, causality, concept, and judgment there is much attention devoted to the psychology of logic. Memory and recognition have extensive treatment. Attention is rather an attribute of the ego than a conscious concept. The qualities of feeling and emotion are discussed at length and methods of experimentation given. A chapter is devoted to judgments of value. An account of the will act is given according to Meumann and Ach. The description of the thought processes, which includes

attitude and determining tendency, is valuable. In the chapter on mind and body it is suggested that a careful examination of the records of the Society for Psychical Research should be made in reference to the question of the future life.

Kleinپeter (4) as he himself remarks in his *Einführung* is strongly influenced by Mach, according to whom knowledge of the inner and outer world is gained from our mental experiences. It is this idea of thus constructing our universe that has guided the author in planning his book. It cannot be looked upon as a text-book, although the author had also a pedagogical purpose in mind. There are many facts which are very clearly presented, but few theories. Experimentation is very prominently considered. A proper balance between epistemological discussion and psychology has been sought. The book is too ambitious to be thorough and the best judgment has not always been used in the selection of material presented. From this interesting little book of about four hundred pages which includes fundamental principles, all the sensations together with descriptions of instruments, reproductions of curves, and methods of experimentation, Fechner's law, the feelings, will, reactions, associations, measurement of mental work, attention, animal psychology, individual psychology, and genetic psychology, it is impossible for the reader to get more than a few suggestions. An exception might be made in regard to the nervous system which curiously enough occupies sixty pages and comes after sensation, which occupies only fifty. There is evidence of a very uneven knowledge of the more recent work, although almost every subject is introduced by a short historical survey.

Rey's book (11) is intended as a preparation for the baccalaureat examination and as an introduction to psychology and philosophy. It is somewhat more than an outline of his course. The first part is devoted to psychology and philosophy between which no sharp line is drawn. The second half to æsthetics, logic and ethics. The book can interest an English reader only in that it gives him an idea of the nature of such a course and the method of instruction in a French university.

Two outlines for psychological experiments have appeared. Hollingworth's book (3) outlines a series of experiments, seventy in number. They presuppose lectures on the several topics and both a general and detailed outline is given for such a course. The book is for the student, who will have to be assisted by the instructor. Most of the experiments require very inexpensive

material. Each topic is introduced by a short discussion, and the experiments are followed by references. There is a special aim to interest the student and to keep him in touch with every-day life. This will be noticed in the arrangement of the book, which differs from most of those previously written in that it begins with the more complex processes such as practice and transfer, as illustrated in the cancellation and puzzle tests, a few of the well-known experiments on the sensations coming near the end of the book. There are also experiments on fatigue, reaction, memory, imagery, attention, judgments, etc.

Breitwieser's little book (1) is in the nature of a primer. The experiments are very briefly described, at times too briefly. For example, instead of merely stating for the materials under one experiment "various taste solutions" and under another "odor solutions" several solutions should have been specifically named. There is a very elementary account of statistical methods and another of the nervous system. Of the 187 pages 33 are blank pages for notes. The experiments, which include those on the sensations, perceptions, attention, reaction time, imagination, memory, and affections, have, as the author acknowledges, been gathered from the works of many authors, the chief sources being Titchener, Myers, Seashore, Witmer, and Sanford.

Several new editions have also been published. Calkins (2) has continued the excellent plan followed in the previous edition of her book of noting in the preface with the page numbers all the changes made. We find that there have been a number of minor changes and two vital alterations. The most important are those undertaken in order to make her system entirely consistent with her concept of psychology as a science of self. The fact is therefore emphasized that the structural elements of consciousness, sensations, feelings, and relations, are forms of the relation of self to its objects. According to this, it is suggested that the expressions, "visual qualities" and "auditory qualities" should be changed to "seeing colors" and "hearing tones." A similar change may be noted in the discussion of the will. The statement that structural elements may be regarded as impersonal is now omitted. Another interesting change is the placing of the consciousness of realness among the relational elements of consciousness instead of classifying it with the affective elements.

In the second edition of Major's text-book (6) the arrangement of some of the topics has been altered, paragraphs have been re-

written and new ones added. The book, however, covers the same number of pages as before. Among the additions might be mentioned a paragraph upon the popular views of attention, and a note, evidently referring to the behaviorists, which states that "it is doubtful whether their (animals') sensory and perceptual processes resemble those of human beings as much as most persons nowadays suppose."

Finally attention should be called to the following three books. A splendid book of general interest is that of Kostyleff (5), the translator of Bechterew's *Psychologie Objective* into French. He has carried out the idea of Bechterew of explaining the mental life in terms of cerebral reflexes by applying this method in detail to the thought processes. One's curiosity is at once aroused, for the three principal sources of his material could hardly be more widely apart in their tendencies; the Bechterew-Pavlow group, the Würzburg school and the school of Freud. The book should appeal to a very large circle of readers including psychologists, psychopathologists and those interested in æsthetics. Especially at this time of vigorous discussions concerning an objective psychology the book is very opportune. In the chapter on the mechanism of ideation the introspective data is taken from the works of Watt, Messer, Bühler, etc. In the chapters on the data from the unconscious, dreams, and imagination, the Freudian school is most prominent. Almost half the book is devoted to an analysis and explanation of æsthetic productions. There are chapters upon the poetic inspiration, the mechanism of a poetic genius, and upon the inspiration in the novel.

The sixth report of the Kongress für Experimentelle Psychologie (12) has appeared in two volumes, the first part containing the reports presented at the meetings, the second the discussion and the special summaries which latter include a thorough summary by Klemm, "Über die Lokalization von Schallreizen," one by Gutzmann, "Über die Beziehung der Gemütsbewegungen und Gefühle zu Störungen der Sprache," and a third by Stumpf "Über neuere Untersuchungen zur Tonlehre."

A collection of the psychological writings of Meinong (7), many of which have been difficult to obtain, has been edited by his pupils. The titles are: "Hume-Studien," "Über Sinnesermüdung im Bereiche des Weberschen Gesetzes," "Über Begriff und Eigenschaften der Empfindung," "Phantasie-Vorstellung und

Phantasie," "Zur Psychologie der Komplexionen und Relationen," "Beiträge zur Theorie der psychischen Analyse," "Über Raddrehung, Rollung und Aberration," "Abstrahieren und Vergleichen," "Bemerkungen über den Farbenkörper und das Mischungsgesetz," "Über Urteilsgefühle, was sie sind und was sie nicht sind."

The first half of the third volume of Tigerstedt's *Physiologische Methodik* (13) dealing with sensations is now complete, and has appeared in book form. It contains methods of experimentation and illustrations and descriptions of instruments. The sensory functions of the skin and organs of movement are discussed by von Frey, smell and taste by Zwaardemaker, light and color sense by Nagel, visual space by Hofmann, the eye by Gullstrand, the non-acoustical functions of the inner ear by Ewald, and the acoustical functions of the ear by K. L. Schaefer.

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SPECIAL REVIEWS

Psychology, General and Applied. H. MÜNSTERBERG. New York: Appleton, 1914. Pp. xiv + 487.

Professor Münsterberg's most recent book of psychology is a textbook of rare individuality and vigor. In compact form it presents the essentials of the most significant contributions of its author to psychological theory: the distinction between "causal" and "purposive" psychology, and the "activity theory" as opposed alike to associationism and to apperceptionism. And to the topics of the conventional textbook it adds chapters and sections on Social and on Applied Psychology.

Part I. discusses general principles. In Part II. the author treats the psychical elements under the main heads, Stimulation, Association, and Inhibition and discusses "complex individual processes" in chapters devoted to Perception, Ideas, Activity, and Inner States. The main topics of the ordinary textbook of psychology—facts of sensation, perception, memory and the like—are clearly set forth in these chapters and are presented with the customary skill of the author.

A final chapter (XV.) on personality (defined from the standpoint of causal psychology as "a perfect interplay of perceptions, memories, fancies and symbols with the feelings, emotions, acts of attention, of thought, and of will" (p. 213)) leads up to Part III. on "The Social Group." This section, like the preceding, considers first "elementary" and then "complex" processes. It starts from the admirably stated contrast between the sociologist, for whom "the starting point is the group itself," and the social psychologist who "must always begin with the individuals" (p. 225). An introductory chapter discusses individual differences under the headings "age," "sex and race," "strictly individual differences in temperament, character and intelligence" and "abnormal differences." There follow a chapter (XVII.) on Union, devoted chiefly to an account of communication, voluntary and involuntary, but including also a reference to the "consciousness of kinship," and a chapter (XVIII.) in which suggestion is contrasted with self-assertion, imitation with sympathy, and aggression with self-

expression. Especially useful is Dr. Münsterberg's account (pp. 254 ff.) of suggestion which is "always," he notes, "a proposition to action," though "not every proposition to action or to belief can be called a suggestion. . . . We have a right," he adds, "to speak of suggestion *only if resistance is to be broken down*. . . . Suggestion," he continues, "is nothing abnormal. There is no human life into which suggestion does not enter in a hundred forms." Both suggestibility to words and imitation of acts are forms of social subordination and both involve sympathy, "an inner imitation of the feelings." All these are contrasted with the equally significant "desire to assert oneself" in its different forms—"rejection of interference," "desire for self-expression and self display." "The combination which results from [the] approach, submission and self assertion" of individuals "is the reality with which the social psychologist is concerned." Otherwise stated, "the social mind" is the object of his study. Münsterberg discusses the social mind in the chapters on "Organization" and "Achievement," elaborating the "analogous physiological basis on both sides" and concluding with a brief and suggestive reference to the qualities of leadership.

Book I. which deals, as has appeared, with causal psychology is two hundred and fifty pages long. In Book II., which occupies only fifty pages, the principles of purposive psychology are set forth. To make these clear it is well to re-state Münsterberg's view of causal psychology which, he says (p. 13), studies "mere mental happenings" and seeks to link them causally. But psychic facts are, he points out (pp. 22 ff.), notoriously disconnected and incomplete. "It lies in the nature of the psychical objects that, however much regularity we may find in their behavior, they can never be directly linked by causal necessity" (p. 31). On the other hand, it can be "shown that man's perceptions and memories, volitions and impulses occur together with brain excitements." "This," to be sure, "is certainly not a *proof* that every mental event is correlated with nervous processes." But it abundantly justifies "the general postulate that every single mental state be understood as the accompaniment of a special brain process" (p. 39). And not only perceptions and memories but feelings, emotions, and volitions may be analyzed, described and explained by the causal psychologist who "cannot acknowledge that there is anything in the mind which does not allow such description and explanation." (Cf. p. 14, and pp. 286-287.)

At this point there emerges the conception of purposive psychology. For, despite its inner consistency, the causal conception, Münsterberg teaches, is not adequate. He therefore finds it necessary for us to regard the inner life as a whole and from an entirely different standpoint. Instead of explaining the mental life we are now to try to "understand its meaning" (p. 287); instead of "resolving the personality into the elementary bits of psychical atoms" we are to show "the true unity of the self" (p. 17); instead of adopting the "neutral attitude of a mere passive spectator" we are to "live through" our feelings and volitions (p. 289). From this essential purposive point of view "everything must be understood in relation to its purposes;" "another man is not the object of awareness but of acknowledgment"; and, finally, "purposes can be valued and every action can be measured by the standards of ideal purposes" (p. 293).

For the detail of this conception of consciousness readers are referred to Professor Münsterberg's pages. The reviewer ventures to add a few words of comment. It is questionable, in the first place, whether the phrase "purposive psychology" fully suggests the conception (sharply opposed to the causal, Humian view) of consciousness as a concrete, living self. The term "self-psychology" is more closely descriptive of what should be a study not only of the willing self but of the perceiving and remembering, the thinking and feeling self as well. To be sure, whether or not one adopt his phraseology, one can not overlook the importance and the timeliness of Münsterberg's vigorous teaching that a merely causal psychology, though consistent and useful, is both abstract and artificial ("a tremendous transformation of reality," p. 289); and that purposive psychology is no branch of metaphysics but a psychological "study and analysis of actual facts" (p. 287). Unhappily however Professor Münsterberg has already, in Book I., treated most of the "actual facts" from a causal point of view and he disappoints the reader by his failure to go back over perception, memory and feeling, to treat each from the purposive point of view, and to point out that the psychophysical, or causal, description and explanation, however relevant, is not sufficient.

As it stands, Book II. is, thus, a mere prolegomenon to "purposive psychology" whereas, in Book I., the author has often seemed to go far beyond the limits of pure psychophysical theory. In particular, the admirable paragraphs, in Book I., on friendship, communication, submission and self-assertion would certainly lose

their meaning if the self were regarded in strict accord with the principles of causal psychology as "a bundle of mental states which are linked together" (p. 12).

The last third of the book (130 pages) is devoted to the consideration of applied psychology "which speaks of the practical application of mental facts in the service of our human purposes" (p. 16). Book III. therefore forms, as it were, a union of the two which precede and affords meeting-ground for causal and purposive psychology. Students of theoretical psychology may profit by the author's admirable and balanced estimate of the value of applied psychology, by his clear statement of its limitations, and by his warning against bringing "the knowledge of applied psychology into any conflict with the natural instincts" (p. 348). Dr. Münsterberg distinguishes *psychotechnics*, which applies psychology to practical problems, from the psychohistorical sciences which "seek the application of these mental laws to the concrete historical facts" (p. 352). His concluding chapters on educational, legal, economic, medical and cultural psychology, are rich in material, clear in arrangement, and fruitful in suggestion.

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Le mécanisme cérébral de la pensée. N. KOSTYLEFF. Paris: Alcan, 1914. Pp. 313.

This volume is an important contribution to the work of the new school which is undertaking to explain the phenomena of human, as well as of animal, psychology strictly in terms of behavior. The author contends that in spite of its experimenting, psychology is still not an exact science because several of its fundamental categories (soul, ego, the unconscious, etc.) remain undefined. But these can all be defined, now, in terms of "cerebral reflexes," and when this is done not only do they acquire exact signification but, furthermore, many hitherto baffling phenomena (such as "imageless thought") find a ready explanation. And the best proof of the author's sincerity and competence is that he in no way avoids or disparages the findings of introspection.

In the first chapter Kostyleff reviews the work of Séchéhennoff, Pawlow, Bechterew and others, and states his own thesis, that all conscious phenomena are to be explained in terms of cerebral reflexes. In the second chapter he boldly engages the most formidable of all his possible antagonists—the Würzburg school. After

expounding with extraordinary lucidity and fairness the work of Watt, Messer, and Bühler, he skillfully shows that precisely what they call "Perseveration" is neural residue, that what they call "Aufgabe" is neuro-muscular setting ("montage"), and that "imageless thought" is the interplay of cerebral reflexes. Indeed the notion of "Aufgabe" is of priceless value to the *objective* psychology (p. 51). And judgment is directed association—directed by an "Aufgabe," a neural setting. This chapter is one of the brilliant documents of psychology.

In the third, fourth, and fifth chapters Kostyleff reviews in a similar way the work of Freud, Jung and others of that school. The work of reinterpretation in terms of cerebral reflexes presents in this case fewer difficulties, but here again we find sympathetic exposition and incisive argument. "Abreagirung," the "unconscious" and even the "censor" find their positions readily and naturally in the psychology of reflex cerebration. But the Freudians have overdone the matter of infantile sexuality; and the psycho-analytic method is scrutinized with considerable frankness.

The next four chapters deal with literary inspiration and genius, and are largely the result of original investigations by Kostyleff. The point of view is very much that of Freud (though not that of some of his younger followers), and the outcome is what one expects from a brilliant mind employing a brilliant method. The interpretation of the phenomena in terms of cerebral reflexes is the same as in the chapters on the Freudian themes.

It will be seen that Kostyleff's volume is a daring application of behaviorism to the higher psychic processes of man. The book is not to be compared with Bechterew's *la psychologie objective* which, to the reviewer's mind, was a sort of pseudo-behaviorism, merely. Kostyleff grasps his subject-matter far more firmly than did Bechterew, and he exhibits an unusual breadth of documentation, sympathy in comprehension, and a merciless directness in criticism. His system is perhaps weakest when it tries to deal with "content" of consciousness (a failing, so far, of all behavioristic interpretations). It is nowhere stronger than in a remarkable passage at the close, where it is shown that the objective point of view is "so far from undermining the moral sciences" that it provides them with an objective basis; a positive foundation for moral education.

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HARVARD UNIVERSITY

BOOKS RECEIVED

BOLTON, J. S. *The Brain in Health and Disease*. New York: Longmans, Green, 1914. Pp. vi + 479. \$5.

FULLER, B. *Life and Human Nature*. New York: Longmans, Green, (no date). Pp. xiii + 339. \$3.

COMPAYRÉ, G. *Horace Mann et l'école publique aux États-Unis*. Paris: Delaplane, (no date). Pp. 121.

COMPAYRÉ, G. *L'éducation intellectuelle et morale*. (2d repr.) Paris: Delaplane, (no date). Pp. viii + 456.

ASH, I. E. *Fatigue and Its Effects upon Control*. New York: Science Press, 1914. Pp. v + 61. 60 cents. (Arch. of Psychol., No. 31.)

The Psychological Researches of James McKeen Cattell: A Review by Some of His Pupils. New York: Science Press, 1914. Pp. v + 101. \$1. (Arch. of Psychol., No. 30.)

SCHUMANN, F. *Bericht über den VI. Kongress für experimentelle Psychologie in Göttingen vom 15. bis 18. April 1914*. Leipzig: Barth, 1914. Pp. iv + 351. Mk. 11.

VIDARI, G. *Elementi di etica*. (3 ed.) Milano: Hoepli, 1911. Pp. xix + 380. L. 3.

MASINI, M. U. & VIDONI, G. *L'assistenza e la terapia degli ammalati di mente*. Milano: Hoepli, 1914. Pp. viii + 233. L. 2.50.

NOTES AND NEWS

THE American Psychological Association at its meeting in Philadelphia elected the following officers: president, Professor J. B. Watson (Johns Hopkins); members of the Council: Professors R. P. Angier (Yale) and W. D. Scott (Northwestern). Professor R. M. Ogden (Kansas) continues as secretary-treasurer.

At its recent meeting the Southern Society for Philosophy and Psychology elected the following officers: president, Professor J. C. Barnes (Maryville); vice-president, Professor E. E. Rall (Tennessee); secretary-treasurer, Professor L. R. Geissler (Georgia).

ACCORDING to the *London Times* A. van Gehuchten, professor of neuropathology at the University of Louvain, has died suddenly at Cambridge University, where he had been prosecuting his work after his removal from Belgium.

THOMAS F. VANCE, PH.D. (Iowa), has been appointed assistant professor of psychology in the Iowa College of Agriculture and Mechanic Arts.

THE first number of *School and Society*, edited by J. McKeen Cattell, has been received. This weekly journal will "emphasize the relations of education to the social order, scientific research in education and its applications, freedom of discussion, and reports and news of events of educational interest." It is published by the Science Press, New York, at \$3 per year.

ANNOUNCEMENT is also made of a new journal for philosophy, *Revista de Filosofía* edited by Professor José Ingenieros, of Buenos Aires. The subscription price is \$5 a year.

